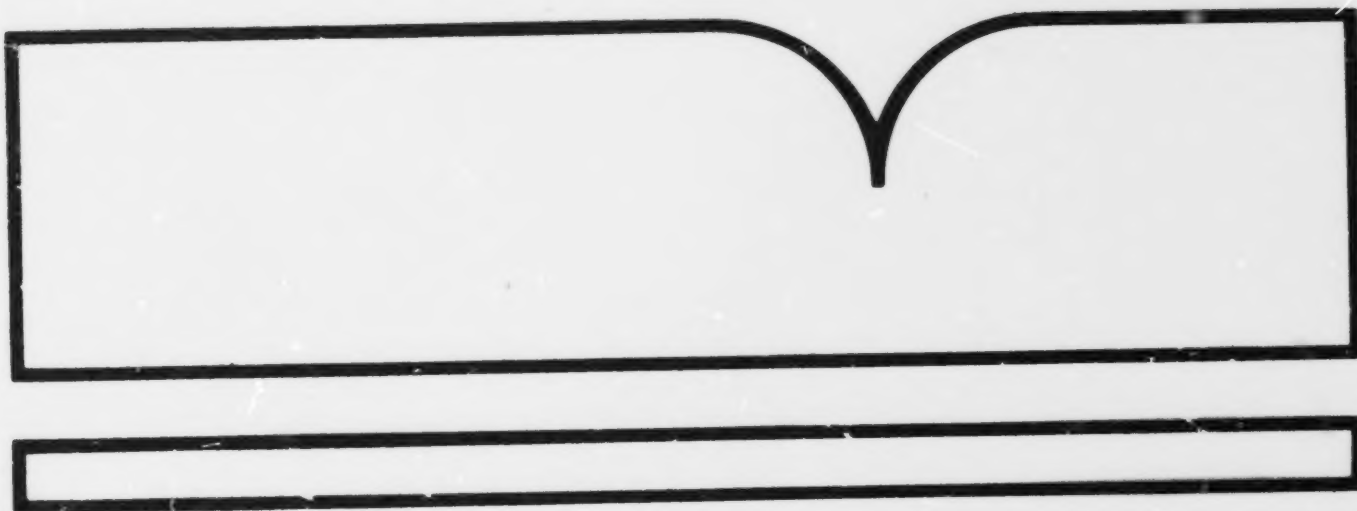


Environmental Research Laboratory-Corvallis

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DRAFT

April 21, 1989

ENVIRONMENTAL RESEARCH LABORATORY - - CORVALLIS

Robert T. Lackey

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United States Environmental Protection Agency
200 S.W. 35th Street
Corvallis, Oregon 97333

Laboratory Functions

The Environmental Research Laboratory - Corvallis is the U.S. Environmental Protection Agency's national research center for terrestrial and watershed ecology, aquatic ecoregions, and for the ecological effects of climate change, stratospheric ozone depletion, and atmospheric pollutants, including acid rain.

In the 1960's and early 1970's the laboratory was solely a water quality research facility. The mission broadened through the 1970's, and now the Laboratory conducts research on the ecological effects of pollutants as they move through the air, soil, and water into the food chain. Scientific disciplines include ecology, chemistry, biology, forestry, fisheries science, wildlife science, geography, microbiology, soil science, geology, statistics, mathematical and computer-based modeling, plant and animal physiology, hydrology, limnology, horticulture, agronomy, and landscape and systems ecology.

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Research is targeted to development of scientific information required for air, water, pesticides, hazardous waste, Superfund, and toxic-substance regulations developed by the Agency in response to existing legislation, international agreements, and treaties. Other research is addressing areas involving potential legislation and regulation.

The Laboratory's research approach to the analysis of ecological effects is generally regional and holistic, with individual research projects contributing to an understanding of specific processes occurring within an ecosystem and across ecological regions. Research consists of laboratory, aquarium, greenhouse, aviary, and field studies on the acute and chronic effects of environmental pollution. Experimental design, statistical and geographical analysis, mathematical modeling, and landscape ecology are applied to help understand and predict changes in natural and stressed environments.

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Vacant, Deputy Director

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Laboratory History

In 1961 amendments to the Federal Water Pollution Control Act authorized the establishment of seven laboratories in specified regions of the United States. The Pacific Northwest Water Laboratory was one of these, and Oregon State University was selected as the site. The University had strong ecological research programs in areas of interest to the proposed Laboratory and cooperation was extensive from the start. Temporary offices were opened in 1963; the main laboratory building was completed in 1966. The Laboratory was initially part of the U.S. Public Health Service.

In 1967 the laboratory was transferred to the Federal Water Pollution Control Administration within the Department of Interior, and its mission shifted from regional, technical support to the conduct and management of national research in water pollution control. The laboratory became a research leader on lake eutrophication, coastal pollution, water quality criteria, gas supersaturation, thermal pollution, sediment criteria, and waste treatment for pulp, paper, and food processing industries.

The Laboratory became part of the newly formed Environmental Protection Agency in 1970, and soon thereafter was named one of four national research centers. A nationwide network of nine laboratories and six field stations reported to Corvallis. The Center's activities expanded rapidly far beyond the original mandate of research on causes and effects of water pollution. In 1972 EPA scientists studying air pollution effects on vegetation were transferred from an EPA laboratory in North Carolina to Corvallis. This marked the entrance in a major way of the Corvallis Laboratory into the emerging field of air pollution and ecological research.

A reorganization in 1975 altered EPA's research centers by having individual research laboratories report directly to the Washington D.C. headquarters. The revamped Corvallis laboratory was named the Environmental Research Laboratory (ERL - Corvallis), and responsibilities broadened further to include diverse programs in freshwater, marine, and terrestrial environment research. Other EPA national research laboratories with related missions are located at Ada, Oklahoma (groundwater); Duluth, Minnesota (aquatic criteria); Narragansett, Rhode Island (coastal); Gulf Breeze, Florida (estuaries); and Athens, Georgia (fate and transport of pollutants).

Since 1978, the EPA has continued to strengthen the six complementary environmental processes and effects research laboratories (Corvallis, Ada, Duluth, Narragansett, Gulf Breeze, and Athens). Similar programs have been consolidated, giving each laboratory a specific focus and scope of work. Coastal research formerly done at Corvallis is now a division of the Narragansett laboratory. Most research developing freshwater criteria at Corvallis was transferred to the Duluth laboratory. At Corvallis there has been a steady increase in responsibilities for the EPA's terrestrial and multi-media research, particularly effects of air pollution on forested ecosystems, grasslands, crops, watersheds, wetlands, lakes, and streams; risks of toxic chemicals to wildlife, plants, and terrestrial ecosystems; ecological consequences of release of genetically altered organisms; cumulative effects of wetlands alteration; ecological effects of hazardous waste disposal; and ecological effects of stratospheric modifications and global climate change (increasing "greenhouse" gases).

Current Research Programs

There are approximately 330 employees (Federal, cooperative, and contract) at the Laboratory. Research is organized into three branches:

Terrestrial Branch . . . conducts research on effects of pollutants and other anthropogenic stressors on terrestrial ecosystems, such as agroecosystems, forested ecosystems, and rangelands, and the effects of acidic deposition on soils, crops, and forests, and loss of biological diversity, an important national and international ecological issue. Effects at individual organism, population, and regional scales are studied. Branch scientists also provide international research leadership on the impacts of ozone and associated pollutants on crops, forests, and vegetation. Biodiversity and air toxics are newer research programs addressing EPA regulatory needs. Other current research concerns include global climatic changes and the ecological effects of increased ultraviolet radiation due to stratospheric ozone depletion.

Watershed Branch . . . conducts research on the effects of pollutants and other stressors on wetlands, lakes, streams, and their associated watersheds. Effects research includes basic biogeochemical process studies and the effects that environmental changes have on fish communities and biodiversity in lakes and streams. Other studies have been used to establish criteria for maintenance of wetlands water quality and biota, to determine cumulative losses and the effectiveness of mitigation practices in wetlands, and to judge the effectiveness of site specific lake restoration practices relative to overall regional water

quality. Research involves regional surveys, process studies, and predictive modeling on the nation's waters and wetlands. Branch scientists conduct research to maintain, reclaim, or enhance the ecological value of wetlands, streams, lakes, and associated watersheds which have suffered loss or degradation.

Ecotoxicology Branch . . . conducts research on effects of toxic chemicals and introduced microorganisms, particularly in terrestrial environments, to wildlife, plants, and soil systems. Branch scientists develop methods to predict uptake, movement, and metabolism of chemicals in plants; assess potential toxicity of chemicals to plants; predict effects and assess impacts of toxic chemicals on wildlife populations; determine behavioral and physiological effects of chemicals on wildlife species; determine risks of genetically engineered microorganisms to terrestrial ecosystems; and produce validated protocols for *a priori* safety testing of chemicals and microbes for nontarget plant, animal, and arthropod species. Research is also conducted on the ecological risks of hazardous waste sites. The branch is developing methods and techniques to detect and quantify engineered organisms as well as determining their survival, movement, and genetic stability in the environment. These methods will predict survival and dispersal of aerosolized microbes based on microcosm, greenhouse, and field experiments.

Research Facilities

ERL-Corvallis is located on two 10-acre research complexes and occupies a leased office building adjacent to Oregon State University. The 10-acre main research complex is surrounded by the Oregon State University campus, 4 additional acres adjacent are under lease from the University to the Laboratory

to conduct atmosphere pollution research. The main complex houses a variety of laboratories, the library, administrative offices, and the computer center. The General Services Administration is negotiating a build/lease arrangement for an office building adjacent to the Laboratory to replace leased office space currently occupied. The other research complex (Western Fish Toxicological Station) is located near the banks of the Willamette River and is currently being converted to a biotechnology research center.

A terrestrial ecology laboratory, sited at the main complex, includes greenhouse research modules. These units house four distinctly different kinds of research projects: toxic effects studies, gaseous air pollution studies, effects of heavy metals on vegetation, and plant propagation and growth studies.

The field exposure facility consists of 21 large open-top exposure chambers, nursery site, automated irrigation system, experimental garden plot, and a control trailer containing automated pollutant delivery/control and data acquisition/ management systems. This field site is a unique setting for research addressing environmental issues of national importance, such as dry/wet deposition effects on conifers, deciduous trees, and crops. Additional adjacent land (4 acres) has been leased from OSU to allow for substantial expansion of these field facilities.

A wildlife toxicology building is used for investigations of chemical risk to wildlife, primarily birds. Research is directed toward investigation and evaluation of laboratory testing protocols and effects of chemicals on wildlife population dynamics recommended by the EPA in response to the Federal Insecticide, Fungicide, and Rodenticide Act, and the Toxic Substances Control Act and the Clean Water Act.

Six 0.1 ha ponds and outdoor pens near the Willamette River provide a facility to conduct research on the chronic effects of chemicals on birds. This field-like setting permits the collection of realistic exposure and effects data for wildlife risk assessment studies on both captive waterfowl and free-flying songbird species.

The Laboratory operates a fully integrated computer facility (VAX 8650/785 cluster), including a large Geographic Information System, digitization hardware, and over 250 microcomputers. Laboratory scientists have access to a super computer.

Cooperating Agencies

The Laboratory supports numerous extramural scientists. Each year eminent scientists are funded to conduct research on-site or off-site working cooperatively with Laboratory scientists. The Laboratory also provides research associateships for post doctoral and senior research fellows through the National Research Council. Frequently, internationally known scientists work cooperatively with Laboratory personnel for extended periods. Research often takes on an international flavor with cooperative programs with Canada, France, West Germany, England, Norway, Sweden, the Soviet Union, Poland, Yugoslavia, the Philippines, and India. Frequently, students from U.S. universities and from other countries work at the Laboratory.

ERL-Corvallis cooperates closely with EPA program offices and other laboratories to implement many national research efforts on complex research problems. Other government agencies, universities, and private industry are involved, often through formal interagency agreements and contracts to fund specific research projects. There are currently more than 120 extramural

research projects in progress, most of which are with university scientists who work closely with their Corvallis counterparts.